

ECG Manifestations: Electrolyte Imbalance

Diercks DB et al. J Emerg Med. 2004; 27(2); 153-60.

Rosen's EM: Concepts and Clinical Practice, 7th ed, 2010.

Goldberger, AL. Clinical Electrocardiography: A Simplified Approach, 7th ed, 2006.

PR interval	Short	Prolonged
	(Think pre-excitation syndromes such as Wolff-Parkinson-White)	High K Low Ca
QRS duration	Narrow	Wide (>100 msec)
	Low K Low Ca Normal	High K High Ca
QTc interval	Short (<350 msec)	Prolonged (>440 msec)
	High Ca	Low K Low Ca
ST segment	Depressed	Elevated
	Low K High Ca	High K
T wave	Peaked/tall	Flattened
	High K	Low K
U wave	Absent	Present
	Normal	Low K Low Ca
Heart rate	Slow (bradycardia, nodal block)	Fast (tachycardia)
	High K High Ca	Low K Low Ca

	Low	High
Ca	<ul style="list-style-type: none"> • QTc prolonged (hallmark) • U wave • Heart blocks, ventricular dysrhythmias, torsades de pointes 	<ul style="list-style-type: none"> • QTc shortened (hallmark) • ST segment depression and shortening • QRS widening • Rare: bradycardias, bundle branch blocks, high degree AV blocks
K	Early to late findings: <ul style="list-style-type: none"> • T wave: decreased amplitude • T wave: flat or inverted • ST segment depression • U wave • QTc prolonged (at risk for VT or torsades de pointes) 	Early to late findings: <ul style="list-style-type: none"> • T wave: tall, then "peaked" (symmetrical) • P wave flattening • PR interval prolonged • QRS widening • Nodal blocks, escape beats • Sine wave: fusion of QRS and T wave --> VF or asystole

Mg derangements: Nonspecific ECG findings; often co-exist with Ca derangements.

- Classic teaching: Low Mg level --> QTc prolongation --> torsades de pointes

